SEASONAL VARIATIONS IN THE INVERTEBRATE POPULATION OF A CENTRAL OKLAHOMA PRAIRIE, NOVEMBER, 1933, TO NOVEMBER, 1934

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During the period of a year beginning November 12, 1933, quantitative collections of invertebrates were made weekly during the school year and fortnightly during the summer at the college farm, three miles west of Chickasha, Oklahoma, in an area of grassland, which was protected from cattle grazing during the growing season. The unit of collection in the ground stratum was a piece of sod, twelve by six inches, three inches deep. The unit of collection in the herb stratum was fifty sweeps with a net of fourteen inches diameter. Collections were carefully sorted at the laboratory of the College.

The period of largest population (Table I), both in herb and ground strata, coincides with the prevernal and vernal societies (March 4 to June 17). Numbers were small in both strata during the estival society (June 29 to September 16). Numbers were high in the herb stratum and low in the ground stratum during the autumnal society (September 23 to December 10), while during the hiemal society (December 20 to February 25) the herb stratum was practically non-existent and the ground stratum well populated.

Taking the year as a unit, the ants and earthworms were the most numerous forms in the ground stratum. The Homoptera (mainly Cicadellidae), Diptera, and Arachnida together made up over three-fourths of the herb stratal population. (Table II).

As shown in Table III, the percentage composition of the ground during the hiemal. prevernal, and vernal societies showed similarity. During the estival society, the percentage composition of the ground was widely at variance with the other seasonal societies. The autumnal society showed great variety in percentage composition by groups.

In the herb stratum, the percentage composition of the seasonal societies varied widely from season to season. (Table III).

Three species of ants made up 61.3 per cent of the forms collected in the ground stratum. *Leptothorax per gandei* was taken only once on March 25. Of the other two species of ants, *Solenopsis molesta* was by far the more abundant. Of the 1,383 ants taken in ground collections, all but 158 were *Solenopsis molesta*. Small earthworms (Table IV) were important in the ground stratum in all seasons except the estival. The beetles of the ground stratum were all seasonal in the duration of their occurrence, except *Triplectrus rusticus*, a carabid, and the staphlynid, *Linolathra filitarsis*. Ground spiders were seasonal also. The springtails, *Achorutes humi* and *Isotoma viridis riparia* occurred during the hiemal, prevernal and vernal collections.

In the herb stratum, the integrity of the seasonal groups was marked (Table IV). Nymphs of Tettingoniidae were found in the vernal society, nymphs of the Acrididae mainly in the vernal society, although extending somewhat before and beyond this period. The beetles, *Phalacrus simplex, Galerucella notulata, Collops quadrimaculatus, Tanymecus lacaena, Hippodamia convergens* and the spider, *Misumessus rosea*, were abundant mainly

during the vernal period. The two species of Hemiptera listed in Table IV were abundant in two societies (vernal and autumnal).

SUMMARY

1. This paper deals quantitatively with annuation in the animal community of a grassland area near Chickasha.

2. In the year described, the population was highest during the prevernal and vernal societies in both ground and herb strata.

3. In the ground stratum, the ant, *Solenopsis molesta*, and the earthworm group were important in all seasonal societies. Other forms were important in one season only in most cases, or at most in two seasons.

4. In the herb stratum, the integrity of the seasonal societies was a striking feature. No forms were abundant throughout several consecutive seasonal societies.

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TABLE I.

Total Number of Animals Per Unit Collection

Date		No. Per Fifty Sweeps	No. Per Soil Sample	Date		No. Per Fifty Sweeps	No. Per Soil Sample
1933							
Nov.	12	37	4	Apr.	19	79	135
	19	58	26		23	167	37
	26	21	4		28	228	159
Dec.	3	121	20	May	9	197	232
	10	117	23		17	208	208
	20	13	18		25	170	98
	24	0	22				
	31	1	5	June	1	170	30
1934					8	292	23
					17	308	72
Jan.	8	1	50		29	131	1
	14	2	136				
	21	1	7	July	13	25	6
	28	0	3	Aug.	1	17	0
Feb.	4	2	38		15	3	9
	10	0	9	Sept.	11	33	9
	17	11	13		16	28	4
	25	0	18		23	26	30
Mar.	4	1	41		30	118	21
	11	7	16	Oct.	6	184	12
	18	2	11		14	145	22
	25	68	465		22	188	10
Apr.	1	62	35		28	122	69
	8	233	84	Nov.	5	269	21

TABLE II.

Percentage Composition of Collections, November, 1933 to November, 1934

Ground Collections	Percent	Herb Collections	Percent
Ants	61.3	Homoptera	48.3
Earthworms	17.8	Diptera	16.5
Beetles and larvae	8.7	Arachnida	11.8
Spiders and mites	3.0	Grasshoppers	8.4
Grasshoppers	2.6	Hemiptera	6.3
Dipterous larvae	2.5	Beetles	3.6
Collembola	1.6	Lepidoptera	2.4
Hemiptera	1.1	Hymenoptera	2.4
Lepidoptera	.7	Miscellaneous	.3
Centipedes	.3		
Homoptera	.2		
Hymenoptera	.2		

TABLE III.

Percentage Composition of the Seasonal Societies

Ground	Hiemal 12/20-2-25 Percent	Prevernal 3/4-4/25 Percent	Vernal 4/28-6/17 Percent	Estival 6/29-9/16 Percent	Autumnal 9/23-12/10 Percent
Ants	48.6	71.5	69.6	6.8	24.8
Earthworms	21	18.7	11.3	14.8	31.6
Coleoptera	14.1	5.1	5.8	61.4	17.1
Arachnida	2.5	1.1	4.0	3.4	6.1
Orthoptera	7.2	1.2	2.9	.0	.6
Diptera	1.6	1.2	2.9	.0	6.9
Collembola	.9	.4	1.7	3.4	6.1
Hemiptera	1.6	.4	.8	.0	4.0
Lepidoptera	1.8	.0	.2	6.8	2.2
Centipedes	.0	.2	.4	3.4	.3
Leafhoppers	.7	.1	.2	.0	.0
Hymenoptera (other than ants)	.0	.1	.2	.0	.3
Herbs					
Homoptera	38.6	52.8	30.0	24.2	64.4
Diptera	28.6	33.4	16.4	8.2	10.4
Arachnida	6.6	3.0	8.1	25.9	17.5
Grasshoppers	.0	6.8	15.9	12.3	.1
Hemiptera	9.8	.2	11.4	8.9	2.8
Beetles	6.6	1.3	6.9	3.6	.8
Lepidoptera	.0	.5	3.0	3.7	2.5
Hymenoptera	9.8	1.4	3.8	1.3	1.4
Miscellaneous	.0	.3	.7	.0	.0

TABLE IV.

List of Some of the Noticeably Important Forms, with Dates, and Numbers Taken Per Unit Collection

GROUND STRATUM. The unit of collection was 12 by 6 inches, 3 inches deep.

Ants—

Crematogaster opaca depilis punctulata Emery. Dec. 3 (13); Jan. 14 (122); June 17 (19).

Solenopsis molesta group. Nov. 12 (2); Nov. 26 (11); Jan. 8 (23); Feb. 4 (3); Feb. 25 (2); Mar. 4 (4); Mar. 18 (4); Mar. 25 (420); Apr. 1 (1); Apr. 8 (58); Apr. 19 (91); Apr. 23 (9); Apr. 28 (88); May 9 (167); May 17 (191); May 25 (68); June 8 (2); June 17 (37); Sept. 16 (2); Oct. 28 (49).

Earthworms—

Eggs. Dec. 31 (1); Jan. 8 (1); Feb. 17 (1); Apr. 23 (1); Apr. 28 (9); May 9 (2); May 17 (1); May 25 (10); June 1 (1); Sept. 11 (2); Sept. 30 (3); Oct. 6 (1).

Young white earthworms. Nov. 19 (3); Dec. 3 (1); Dec. 10 (14); Dec. 20 (12) Dec. 24 (3); Dec. 31 (2); Jan. 8 (14); Jan. 21 (1); Jan. 28 (1); Feb. 4 (1); Feb. 10 (3); Feb. 25 (4); Mar. 4 (2); Mar. 11 (9); Mar. 25 (30); Apr. 1 (12); Apr. 8 (19); Apr. 19 (38); Apr. 23 (24); Apr. 28 (45); May 9 (23); May 17 (1); May 25 (1); Sept. 11 (2); Sept. 23 (22); Sept. 30 (12); Oct. 6 (6); Oct. 14 (16); Oct. 28 (1).

Earthworms adult. Dec. 3 (3); Dec. 24 (9); Jan. 21 (1); Feb. 4 (11); Feb. 10 (1); Feb. 25 (1); Mar. 4 (15); Mar. 25 (1); Apr. 1 (3); Oct. 14 (1).

Coleoptera—

Ataenius sp. near californicus. July 13 (5); Aug. 15 (9).

Bembidion (Notaphus) intermedium Kby. Jan. 28 (1); Feb. 4 (1); Feb. 17 (1).

Selenophorus pedicularis Lec. Mar. 18 (2); Mar. 25 (1).

Tachistodes testaceus Dej. May 9 (2); May 17 (2); June 17 (6).

Triplectrus rusticus var. Say. Nov. 19 (1); Jan. 8 (1); Mar. 25 (1); Apr. 1 (1).

Linolathra filitarsis Csy. Nov. 19 (2); Mar. 25 (1); Sept. 30 (1).

Blapstinus moestus Melsh. Feb. 25 (1); Mar. 18 (1).

Melanaphthalma spp. June 1 (2); June 8 (1).

Spiders—

Drassidae young. Mar. 4 (1); Sept. 30 (2).

Eperigone sp. Nov. 19 (1); Dec. 20 (1).

Lycosidae young. Dec. 20 (1); Jan. 14 (1); Feb. 10 (1); Mar. 4 (1); June 1 (14).

Pellenes new species. Feb. 25 (1); Apr. 1 (1); June 29 (1).

Collembola—

Achorutes humi Folsom. Nov. 19 (8); Feb. 10 (1); Feb. 25 (1); Mar. 4 (1); Mar. 18 (1).

Isotoma viridis riparia Nicolet. Mar. 4 (1); Apr. 28 (2); May 9 (10); May 17 (1).

Pseudosinella violenta Folsom. Sept. 11 (1).

Orthoptera—

Eggs. Dec. 24 (6); Feb. 4 (13); Feb. 25 (1); Mar. 4 (9); May 9 (1).

Nymphs. Jan. 8 (1); Jan. 14 (2); May 9 (11); June 8 (12).

HERB STRATUM. The unit of collection was 50 sweeps with net of 14 inches in diameter.

Orthoptera—

Long-horned grasshopper nymphs (Tettigoniidae). Apr. 23 (3); Apr. 28 (2); May 9 (16); May 17 (25); May 25 (17); June 1 (46); June 8 (27); June 17 (8).

Short-horned grasshopper nymphs (Acrididae). Apr. 8 (9); Apr. 19 (8); Apr. 23 (22); Apr. 28 (18); May 9 (44); May 17 (3); May 25 (1); June 1 (3); June 8 (2); June 17 (22); June 29 (20); July 13 (4); Aug. 1 (4).

Coleoptera—

Phalacrus simplex LeC. May 9 (40); June 17 (1).

Galerucella notulata F. May 9 (2); May 17 (1); May 25 (3); June 8 (1).

Collops quadrimaculatus F. Apr. 28 (3); May 17 (10); May 25 (3); June 1 (2).

Zygogramma disrupta Rog. June 8 (1); June 17 (1); June 29 (3); Aug. 1 (1).

Tanymecus lacaena Hbst. May 25 (1); June 1 (2); June 17 (1); June 29 (2).

Hippodamia convergens Guer. Apr. 23 (1); May 9 (1); May 25 (3); June 1 (1).

Spiders—

Misumessus rosea Keys. May 17 (5); June 1 (7); June 8 (10); June 17 (1); Aug. 1 (1).

Hemiptera—

Polymerus basalis Reut. Nov. 26 (3); June 17 (3); Oct. 22 (1); Oct. 28 (1); Nov. 5 (6).

Harmostes reflexulus Say. May 17 (3); June 17 (1); Oct. 28 (1).